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zodiacal light. 2ndly, That there was on that morning a flux and reflux of the light. I cannot attempt to account for the former; but I suspect that the latter appearance arose from a rising and sinking of the imperceptible terrestrial vapour.

“EDWARD J. COOPER.

“*To the Secretary of
The Royal Irish Academy, &c. &c.*”

Mr. William Hogan read the following notice of **the storm** of Sunday, 6th July, 1845 :

“I was in Leamington at the time, and, though it did not rage there, I had an opportunity of witnessing the atmospheric phenomena, as the thunder-cloud passed at a small distance to the north, and I observed its course for an hour and a half.

“To shew what its aspect was to those over whom it passed, I extract the following particulars of its history twenty miles to the north of Leamington, from the published account of Mr. Onion, of the Philosophic Institution at Birmingham. After alluding to a violent storm of the preceding Thursday, he says: ‘Birmingham has again been visited by a thunder-storm more terrible, and in its consequences more disastrous, than the former. On Saturday afternoon the thermometer varied at different times from 70° to 78°; *not a breath of air stirring*, the barometer being moderately high. About eight o’clock, P. M., a few heavy drops of rain fell, which were shortly afterwards followed by a complete deluge of water; the lightning was grand and awful in the highest degree, flash succeeding flash in rapid succession, and of that beautiful purple tint which betokens a large quantity of free electricity in the atmosphere. The thunder in the mean time rolled in nearly one continued peal; the wind, which had been varying from S. E. to E., suddenly shifted to S., and about the middle

of the storm the vane *veered suddenly and with great rapidity through the whole points of the compass*, again setting in the south. For the space of three or four hours afterwards it continued very inconstant, changing in all directions, and eventually settling in the S. W. In the short space of half an hour 1.945 inches of rain fell.'

"Such were the phenomena at Birmingham as the thunder-cloud passed over it. Its arrival was preceded by oppressive heat and a dead calm, while a fresh breeze blew at Leamington. Its passage was marked by a whirlwind, with constant lightning, and the fall of nearly two inches of rain in half an hour.

"Particular circumstances led me to be an attentive observer of the state of the atmosphere from seven to half-past eight on the evening of the 6th of July. I saw the thunder-cloud appear in the south-west, and pass over Birmingham in its course towards the north-east; it was of great extent, and I should think very high; a rapid current of air in the same direction carried a light scud under the cloud, or at least between me and it, so as to appear under it. The heat was intense the whole evening, *but previous to and during the storm we had a constant fresh breeze from the south-east*; the cloud came from south-west. The lightning was very brilliant and constant, but I heard very little thunder, perhaps owing to the state of the wind. In shape and appearance the cloud might be represented by the map of Africa, from the Bight of Benin southwards, laid on its side, with the eastern coast and the island of Madagascar uppermost. A cloud of the relative size and position of this island kept constantly and steadily in advance of the larger one, and all the lightning which I saw until the cloud passed was from the upper surface, and generally played round the cloud represented by Madagascar, though it sometimes darted out from the latter in every direction. It was forked lightning, but its appearance was not that of bars of light, but such as one would observe were the electric current sent along a zig-zag chain in a darkened room.

“As the cloud passed on to the north-east, and I looked after it, the end next me had the appearance of a vast crater, emitting forked lightning and flashes of light; and it was from this crater-like opening that I suppose the lightning was emitted which was visible at Birmingham, after the storm had ceased and the cloud passed on towards Nottingham.

“All accounts say that meteors and lightning were observed at the rear of the cloud for an hour or two after the tempest. When the cloud had nearly passed over Birmingham, the quantity of ozone which saturated the air at Leamington was so great as to be very unpleasant, and I was obliged to close the window to exclude it. It is to be observed that no rain fell in Leamington at that time, and consequently there was no moisture to absorb the ozone and prevent its accumulation. The lightning always broke from the upper surface of the cloud while it passed before me; when I looked after it, it came from the inside of the crater-like opening in the rear, but never from the surface next the earth. The unpleasant effects of the storm on the invalids of my party soon afterwards occupied all my attention.

“This immense cloud, so heavily charged with water, appeared to be completely isolated; it did not attract the flying scud, nor did it break into masses; and the sky became serene and blue when it had passed. I observed its approach from the south-west; at eight it had reached Birmingham, and at nine it had passed. I traced it in the local newspapers in a straight line from Hereford to Nottingham, where it caused prodigious floods, passing over Kidderminster, Dudley, and Birmingham, in a direction from south-west to north-east. All the newspapers agreed in their general description of brilliant, constant lightning, and heavy rain; some also spoke of hail.

“About twenty miles to the south-west of Birmingham the storm began at seven P.M., and ceased about eight P.M.; at that time it had reached Birmingham, where it raged about an hour. I therefore conclude that the cloud was

twenty miles long, and that it passed over its own length in an hour; or, in other words, that it only moved at the rate of twenty miles an hour, carrying the whirlwind along with it; for that the whirlwind was caused by the cloud, and had no connexion with the tranquil current of air which bore it, was evident.

“Where this immense cloud was formed, and charged with materials for such prodigious torrents of rain, and by what means that immense weight was supported, are problems for the meteorologist. Supposing that the rain fell as heavily in other places as in Birmingham—and every account makes the supposition probable—every square superficial foot of the under surface of the cloud must have given out two inches of water per hour; and calculating six gallons to the cubic foot, every superficial square foot must have deposited one gallon per hour during its course; and if that course only lasted six hours, each superficial foot must have given out 50lbs. of water in that time.

“Whether the cloud actually carried this weight of 50lb. on each square foot, and if it did, what was the sustaining power which enabled it to do so, would not be easily told; but another question suggests itself, was all, or the greater part of the water deposited during its course, generated from time to time in the cloud? One thing seems clear, constant lightning accompanied the release of the water from its aerial carriage, and a whirlwind seems to have been necessary to supply the consumption of atmospheric air.

“The great accumulation of heat for two or three days before such violent thunder-storms, seems to indicate that they are preceded by a cessation of some ordinary heat-absorbing atmospheric processes over the places where the storm afterwards passes. In the case of this storm Mr. Onion says, that the barometer had been in a very unsettled state for some days previously, often in the course of twenty-four hours rising or falling to a considerable amount, although not followed by

a corresponding change in the weather. Perhaps the phenomena of a thunder-storm are due as much to the state of the atmosphere in each locality, as to the ominous black cloud which passes over it at the time of their appearance.

“A few days after the storm of the 6th of July, I had an opportunity of observing some of the effects of the whirlwind which accompanied the cloud, and thus tracing a portion of its course. It was at Hilhampton, adjoining Whitley Court, the residence of her Majesty the Queen Dowager, which lies on the direct line between Hereford and Birmingham—several large, full-grown elms, standing in the middle of a field, were torn up by the roots; other trees were stripped of their branches at one side only, while the stem and remaining branches had not been touched; a low brick wall, not a foot high, which supported some paling, was torn up. It did not proceed in a straight line, but in a zig-zag or curve, running in the direction of the course of the cloud; and what is a little remarkable, the dwelling-house, which was not injured, lay in one of the bends of the curve; a large fir tree in the front had all the branches on one side twisted off, and a walnut tree immediately behind the house suffered in the same way; neither tree was ten feet from the house which was between them, and it was in its course round the house that the low brick wall was torn up; it then passed amongst some hay-cocks, which it carried off and scattered.”

Colonel Harry D. Jones gave the following account of recent excavations which he made in the Round Towers of Clonmacnoise:

“As some time must necessarily have elapsed before the vegetable material in the large tower could be removed to the level of the lower floor, it was determined to employ another party in sinking below the foundations of the smaller tower, called Teampull; the ground in the interior was level with the sill of the door and with the ground outside.